# The Chemical Age

**A Weekly Journal Devoted to Industrial and Engineering Chemistry**

BOUVERIE HOUSE, 154, FLEET STREET, LONDON, E.C.4

Telegrams: ALLANGAS FLEET LONDON
Telephone: CENTRAL 3212 (10 lines)
GLASGOW: 116, Hope Street (Central 3970)
BIRMINGHAM: Daimler House, Paradise Street (Midland 0784-5)
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# Chemotherapy

THE lectures of the Royal Society of Arts are famed for attracting lecturers of a high standard. In the 1940/1 Dr. Mann Lecture, Dr. G. Stafford Whitby revealed himself as a master of the art of making a difficult subject interesting to an audience which must have numbered among its ranks few of high training in organic chemistry. Chemotherapy, which may be defined broadly as the enlistment of chemistry to attack bacteria in the tissues, started essentially when the first anæsthetic was administered; it has been pursued in a desultory way for years, since Paul Ehrlich founded the modern school of therapeutics by propounding certain somewhat nebulous principles which still serve as a general guidance for the chemist and biologist. But it is only quite recently that it has made the fundamental advances which have caused it to become among the most fascinating of medical and chemical subjects and one that holds out potentially perhaps the greatest possibilities of any branch of the sciences devoted to curing human and animal ills. The aim is briefly to find chemical substances, generally substances that are produced synthetically, that will attack and destroy selectively the organisms to which a disease is due without at the same time affecting the body generally. Among Ehrlich's principles was one which states that if a chemical is to fasten on to an organism and thus be enabled to destroy it, there must be a certain affinity between the two. This principle he propounded from his work on the staining of tissues or organisms by dyes, but it holds equally well in the field of colourless bodies.

Dr. Whitby first reviewed the anæsthetics and particularly the new basal anæsthetics. This led naturally to the disinfectants which must be used for preventing infection of a wound during surgical operations as well as at all other times. Pasteur suggested phenol for the purpose, and Dr. Whitby, inquiring what caused him to do so, made the interesting discovery that this was because phenol application was already known to Pasteur as a method of treating sewage, inhibiting the deleterious effects of applying the sewage directly to the land. Angus Smith and McDougall used lime and phenol for treating Carlisle sewage, and obtained a patent for the process in 1855; Pasteur's suggestion was made in 1864 and his first paper on the subject was read in 1867.

The slow and tedious process of trial and error must be followed by the therapeutic chemist. He can gain some inkling of the possible chemical structures worth trying by ascertaining the structures of known natural drugs having a similar action. The synthetic drugs are usually simpler in structure than these, but must evidently contain the essential chemical groups. Disinfectants kill all germs and organisms, and therefore may be expected to affect the body adversely if administered internally; it is necessary then to determine which of the substances tried will have the desired selective action. This the biologist must do. The chemist by himself can do no more than prepare hundreds of chemical substances in a state of purity, gaining whatever hints may be possible from the results of the investigation of the action of these on animals, and sometimes on human beings. It is a long, tedious, and heartbreaking business; but when success has been won it is more than worth all the toil involved.

To follow all the groups of compounds with which Dr. Whitby dealt would be impossible here. There is no space to tell of how, for example, quinine, which is known only to affect the asexual malarial protozoa, has now been reinforced by plasmoquin, which affects the sexual type; of how the clotting of the blood aided in nature by vitamin B1 can now be brought about by the synthetically-produced 2-methyl-naphthaloquinone, found in coal tar, which has the same structure as the vitamin but without a lengthy side-chain (it is said that 80 per cent. of infantile mortality which takes place within 3 days of birth is due to cranial hæmorrhage due to lack of B1 in the system); of the discovery and development of salvarsan and neosalvarsan for sleeping sickness and syphilis; of the discovery and development of the amidines; and of the astounding potentialities of the sulphonamides. These things are revolutionising medical practice, and, as the experience of chemists enables them to perfect the technique of drug research, there can be little doubt that through this work the chemist and the biologist together will conquer disease. Already it has been discovered that certain natural substances can neutralise the favourable action of some of these drugs, and it is suggested that these substances may develop in cancer, thus causing the difficulties we have to contend with there.

Dr. Mann, who instituted these lectures, lived in the days before Pasteur, when the causative agency of disease was yet unknown, and when the authorities were content to do without sanitation and to let the Fleet remain an open sewer. Through what vast tracts of knowledge have we travelled since those days! It is pleasant to record the chemist as a benefactor of the human race instead of the deviser of poison gases and of bigger and better explosives for the work of destruction.

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# NOTES AND COMMENTS

### Fire-Fighting Chemicals

THROUGH the agency of its Parliamentary Secretary, the Ministry of Home Security has officially expressed the opinion that in no case has a proprietary chemical liquid been found which could be recommended in preference to water for extinguishing fires caused by invendiary bombs. It is further contended that many of these chemical substitutes had been tested by the Ministry's research and experimental department and found unsuitable, for one reason or another. In our opinion, the Ministry goes too far. For general purposes, in dealing actually with an incendiary bomb, water is the safest and surest extinguisher; this we have already said in these columns. But there are special occasions when water is not only ineffective, but even dangerous—in the case of a fire of electrical origin, for example, or a petrol blaze. Further, from information received from a manufacturer of a fire-extinguishing solution, it would appear that some at any rate of the "tests" referred to by the Ministry were conducted under conditions that can only be described as unfair to the material under test, and that when tried in a reasonable manner the chemical extinguished an incendiary bomb and the resultant fire much quicker than could be managed by water, and without excessive smoke or fume. When speed is all-essential, it is not a bad idea to try an extinguishing solution *made by a manufacturer of known reputation,* having subjected it to tests beforehand, although water is certainly safer than the unknown. The last word on this subject, however, has yet to be said, and we hope to consider it further in a future issue.

### Physicists and the War

THE importance of physics in the war effort is reflected in the maintenance of the rate of increase of membership of the Institute of Physics at the peace-time level of about one hundred per annum, noted in the annual report of the Institute issued last week. The report states that the demand for trained physicists for work of national importance both in Government departments, in industry, and as technical experts with the Armed Forces continues to be urgent, and the supply is not adequate to the demand. The Institute has placed at the disposal of the Ministry of Labour and National Service all the information at its command. The Ministry of Labour and National Service is fully appreciative of the importance of physics in the war effort and it is taking all possible steps to ensure that the flow of training physicists through the universities and technical institutes shall be maintained. A particularly valuable undertaking has been the war-time extension of the facilities of the Institute's panel of consultants, whereby inquirers on technical problems in applied physics are put in touch with members most likely to be able to offer immediate practical suggestions in any particular case. The report shows that the normal activities of the Institute and its branches have continued, and indeed some have been increased during the past year; for example the London and Home Counties' Branch held a record number of meetings during the year. The formation of divisions of the Australian branch is recorded, the headquarters of those so far formed are at Sydney, Melbourne and Perth.

### Women in Chemical Engineering

A KEEN sense of "news value" is observable in the first number of *Engineering Bulletin* (June, 1941), a new monthly publication issued by the Ministry of Labour and National Service and designed to help the engineering industry in current problems of labour utilisation. It is a well-known principle of the popular Press that a story about a woman may be news where the same story about a man would be as dull as ditch-water; and under the rubric "Women in War Industry," the new Bulletin has any amount of topical material ready to hand. Of course we have all heard stories about the difficulties of employing newly-trained female labour in factories engaged in heavy industry; and, frankly, most of us find that such stories are beginning to pall a trifle. It is, therefore, the more refreshing to read of some of the successes of women workers in spheres where men were hitherto believed essential. Here are a few instances which have some bearing on the chemical aspect of engineering; in the Birmingham area, 70 women engaged in covering fuel tanks with rubber layers were found to reach a high standard of efficiency in ten weeks or so; at an I.C.I. factory women have taken on heavy deep drawing through presses; tank assembly, too, has unexpectedly proved to be well within the scope of selected women. In quite another direction, women workers in Scotland are recorded as being capable of optical grinding and polishing to the extraordinarily fine limit of .0000025 inches; and at a Coventry works, where micrometers are used for gauging limits of ±.0005 in., the foreman finds that girls are more efficient than semi-skilled men.

### Promotion and Commonsense

SCOPE for the promotion of women within the factory is demonstrated by the existence of a woman works manager in the Midlands, as well as women deputy works managers who can do most jobs in the shop. But perhaps most encouraging of all are the signs that commonsense is replacing prejudice and tradition in the matter of women's employment. It has long been known that women could stoke retorts and boilers successfully; but their first really large-scale success in this field was made possible by the suggestion that they might fire better if provided with slightly smaller shovels than men use. Similarly a slightly raised flooring, a smaller-handled tool, a lowered packing on the bench—all have led to greater efficiency and speedier output. In brief, the principle now being followed is to adapt the conditions of the job to suit the women's slighter build. In view of the fact that many male workers have to be called on to do fighting work outside the factory, we venture to suggest that this principle is more profitable than a continual grumble over the necessity for using female labour.

# Glass and Glazing

### New British Standard

THE preparation of a British Standard for glass and glazing, including definitions and terminology of work on glass (B.S. 952), was undertaken at the request of the glass manufacturers themselves.

The first section dealing with the definitions is divided into five sections, namely transparent glasses, translucent glasses, opal glasses, other forms of glass such as wired glass, prismatic glass and lead glass, and miscellaneous glasses such as neutral tinted glss thermolux, non-actinic, etc. Part 2, covering terminology of work on glass, gives a description, with diagrams, of typical methods of working.

Copies of this specification may be obtained from the British Standards Institution, 28 Victoria Street, London, S.W.1, price 3s. 6d. each (3s. 9d. post free).

# CO-ORDINATION OF THE CARBONISING INDUSTRIES*

by G. E. FOXWELL, D.Sc., M.Inst.Gas E.

PROFESSOR WYLD'S Universal Dictionary defines the verb "to co-ordinate" as (i) "To bring into logical or organic relations," and (ii) "To bring into such relation that the things co-ordinated take part in a common action." The discussion of possible methods of bringing the carbonising industries into logical or organic relation with one another so that they take common action involves issues so far-reaching that within the allowable limits of space it is not possible to do more than indicate the broad outlines. The varied ownership of the carbonising industries, comprising gas companies, municipalities, collieries, and low-temperature carbonising concerns—all frequently having divergent interests—increases the complexity of the problem.

Co-ordination is necessary or desirable for several reasons:

(a) For efficient utilisation of the national coal resources. E. V. Evans[1] has shown that carbonisation conserves coal. Thus, a national fuel policy should greatly increase the quantity of coal carbonised. But this policy will only be sound if all the products are utilised to full advantage, an objective which can only be attained by co-operation among the industries concerned.

(b) To prevent unnecessary inter-competition.

(c) To promote mutual prosperity by a common sales policy and by regulation of production to meet market conditions.

Co-ordination must take into account the markets served by the carbonising industries, since the objectives of co-ordination must be related to the requirements of the consumers.

The gas industry load is divided into: domestic, 60 to 70 per cent.; commercial, 10 to 20 per cent.; industrial, 10 to 20 per cent.; public lighting, 5 per cent.[2] Most industries require cheap gas. For domestic and commercial uses some gas can be sold at luxury prices,[3] but the way to considerable expansion in the gas industry lies in lowering the price of gas relatively to the total cost of living. This policy will lead to the all-gas house, the greatest single opportunity before the gas industry in our generation. Consumers also require coke and hitherto the combination of gas and coke has operated in most districts greatly to the advantage of each, making the "all-gas-products" house practicable as at Kensal House and Sassoon House. Difficulties in coke disposal met in certain northern districts are primarily due to deficiencies in methods of coke marketing.

The gas industry's objective must therefore be to retain its present advantageous service to the consumer together with a reduction in the relative price of gas, objectives which demand also a strong coke and by-products market.

## The Coke Oven Industry

The coke oven industry must supply coke to the iron and steel industry and also serve the "general" coke market. A sale for the gas must be found at a reasonable price if the economics of a modern coking plant are to be sound,[4] and in the interests of coal conservation.

A self-contained iron and steel works comprising blast furnaces, steel furnaces and rolling mills utilises the whole of the combustible gas produced in its operations. Although the British iron and steel industry has lately been reorganised, by no means all works are self-contained, the steel works being separated geographically from the blast furnaces, and the blast furnaces from the coke ovens. Furnace coke is thus made (a) in ovens situated at steel works where the gas is wholly used internally, (b) in ovens situated at steel works where only part of the gas is used internally, and (c) at collieries where none of the surplus gas is efficiently utilised internally.

The iron and steel industry requires a fluctuating supply of coke according to the state of trade. A governing principle is that sufficient coking capacity must always be available in the country to provide the coke needed for this industry.

While only gas undertakings may sell gas, the coke market has been open to all to sell fuel in it at whatever price the supplier cares to charge. This led to price-cutting and a very unsatisfactory position which was partly corrected by co-ordination before the war. Coke ovens serving the "general" coke market may either do so as an adjunct to the production of furnace coke or may make coke wholly for that market. The fluctuating supply of oven coke to the general market caused by the demands of the iron and steel industry is a difficulty which co-ordination must be designed to correct.

Both the gas industry and the coke oven industry supply coke to the export market. These activities are already co-ordinated and this co-operation must be maintained and the scope of its operations extended after the war.

The general objectives of the coke oven industry must thus be to secure a reasonably remunerative outlet for its gas and to extend the demand for coke.

## Low-Temperature Carbonisation

The low-temperature carbonising industry produces a solid smokeless fuel, selling at high prices, which is popular when reasonably free from ash. The quantity of coal carbonised is small and it is as yet uncertain how far this branch of the industry will expand. The need for its expansion is a favourite theme of politicians, but from a fuel standpoint its justification appears only to lie in the provision of a solid smokeless fuel which can be burnt in existing grates designed originally for coal burning; as coke-burning grates become more general the necessity for such highly combustible fuel will disappear in favour of a less combustible fuel based on high-temperature carbonisation of selected coals plus activation. Co-ordination will thus primarily concern the gas and coke oven industries.

It is here laid down as a proposition that industries which are to be inter-co-ordinated must first be themselves internally co-ordinated. Co-ordination can be seriously hampered, and even wrecked, if any substantial proportion of either industry remains outside the arrangements made.

The coke oven industry was largely composed of discrete units until the formation of the National Association of Coke and By-Product Plant Owners. All coke oven owners do not yet belong to the Association; moreover, its present scope is not sufficiently wide to deal effectively with the issue of co-ordination with the gas industry. The British Hard Coke Association was organised fully in May, 1940, with Government patronage, but for the duration of the war only. There is evidently need for the perpetuation of a body of this character which can co-ordinate production and disposal within the industry itself and which through its general committee can co-ordinate policy in such a way that the decision will be binding upon the industry as a whole. Colliery tradition seems inimical to the team spirit, but the British Hard Coke Association and the National Association of Coke and By-Product Plant Owners together afford ample basis and experience upon which a satisfactory organisation can be built.

The gas industry is in little better case. It is not binding upon any undertaking to accept the views of any controlling body. With increasing demand for specialist technical services in every walk of life, the day of the small undertaking is passing. The chemical industry realised this after the last

* A paper presented to the Institute of Gas Engineers in the Symposium "The Gas Industry—1941 and After," No. 240, pp. 40-48.

war, and although Imperial Chemical Industries, Ltd., does not comprise the British chemical industry, it includes the major basic chemical industries, and Mond's great merger has immensely strengthened the chemical industry both internally and in its foreign dealings.

As a preliminary, though not perhaps an essential preliminary to inter-co-ordination, the gas industry should be unified. This might be effected on the general lines of the scheme proposed in the P.E.P. " Report on the Gas Industry " (1939) taking also into account the experience of the chemical industry. A merging of financial interests in one great concern might be necessary, and an organisation could be visualised in which a Central Board of Directors controlled the general policy of a number of large subsidiary regionally-organised companies represented on the Central Board, each having its own Board of Directors, its own senior regional engineering staff, chemical staff, industrial gas department, gas sales organisation, and so forth. These Boards in their turn would control the individual gas undertakings, which would retain their own staffs, engineers and managers, unless geographical or other considerations made it desirable that they should be directly merged with other undertakings. The local engineer would thus retain his freedom in dealing with local problems, while policy would be directed from the centre and the local manager would receive all the skilled assistance he required in engineering, advertising, sales, and so forth.

This proposal is on the lines of the development of modern industry in the last 25 years and thus contains nothing fundamentally revolutionary. It is the logical development of the holding company movement of the past decade. It would facilitate co-ordination between the gas industry and all other cognate industries, including the electrical industry, the coke oven industry, the coal industry, and the chemical industry.

While it is believed that this type of organisation would give strength and stability to the gas industry, a consummation which the present war-time difficulties have surely shown to be desirable, co-ordination within the carbonising industries could be secured without such far-reaching changes in the gas industry. The general tendency to concentrate the business of gas supply in the hands of a few large undertakings or holding companies has already facilitated common action, and it should thus be possible to achieve a common co-ordination policy without setting up this elaborate organisation which might take years to bring into being.

## Inter-Co-ordination

Industries which have thus been themselves co-ordinated may then be co-ordinated with one another. The co-ordination must take the form of close working arrangements conceived and carried out in a spirit of mutual helpfulness to achieve the objectives set forth at the beginning of this paper. Such common action will differ according to the product which is being considered. Gas, coke and by-products will therefore be considered separately.

The principle underlying the co-ordination of gas supplies must be to make use of as much as possible of the surplus gas that exists in the country, from whatever source it may be derived, and to bring gas into the service of industry as widely as possible. The war has shown that concentrations of population are not necessarily advantageous. If we are to remove slums permanently there should be a development of garden cities, and this must involve spreading industry over a greater area.

Under war conditions there is no difficulty in the disposal of surplus coke oven gas. After the war this situation will be changed because the demand for industrial gas will probably fall as industry relaxes from present production peaks. Gas undertakings must also search for new outlets for gas.

For these reasons, and in the interests of national town planning, it is here suggested that the gas and coke oven industries together should set up a number of regional gas grids covering industrial areas. The purely residential and agricultural districts too far removed from a grid would be left to receive their supply from local works as at present.

Some of the possible grids were considered favourably and in detail as long ago as 1934.[5] The minority report of the Departmental Committee on Gas Supplies in the West of Scotland (1936) concluded that a gas grid in that area was desirable, though the majority report was in favour of a more restricted scheme at that time. The United Kingdom Gas Corporation is already engaged on an embryonic grid in West Yorkshire.[6]

It is usually possible to prove on paper that the establishment of a gas grid is uneconomic when based upon existing demands for gas. When, however, the gas is available the demand grows and a sufficient supply can be sold to make the scheme profitable. The provision of gas grids should not be regarded in a narrow spirit of immediate economics.

## Centralisation

The coke oven industry for its part could assist in the development of these gas grids by centralising production in very large units situated at a convenient point for the distribution of gas and coke. Large coke oven plants on the Tees and Tyne, for example, would be much better situated for the disposal of their coke by water and of their gas by trunk mains than are the many scattered inland plants in that area. The cost of coal to these plants would be increased by about 2s. per ton over the present pit-head price, or by less if it were sent by aerial ropeway or water-borne in pipe lines.

If financial difficulties prevent the carbonising industries from carrying out this scheme it might be sponsored by the Government. Great public works, primarily of a civil engineering character, will be undertaken to provide employment for the difficult period after the war. The provision of the necessary trunk mains here suggested might well rank among these schemes in its value to the nation. In districts not served by grids there should be arrangements which would prevent gas undertakings from building new carbonising plant while a neighbouring existing coke oven plant has surplus gas to sell.

The grid system here visualised would obviate much of the difficulty and the expense now connected with the problem of ensuring continuity of supply.

A gas supply of this composite character would not achieve the same standard of constant combustion characteristics as a single gas undertaking. Appliance makers appear to be designing burners unduly sensitive to the characteristics of the gas supplied to them. This tendency appears to handicap development; burners of a more catholic taste would seem to have advantages. The non-Bunsen type of equipment is a distinct advance in this direction.

After the war, recognition of the values of coke will grow. The gas industry was brought up in the belief that coke was an unimportant by-product. After a century and a quarter much of the gas industry has not yet grown out of that belief. In many districts about 99 per cent. of the sales effiort is devoted to gas and 1 per cent. to coke; it is not surprising that those districts complain that coke is difficult of disposal. Most parts of Britain are backward in coke selling methods and everywhere there is much yet to be understood regarding coke quality.

## Selling the Products

In order to manufacture coke of the right quality it is necessary first to secure the right kind of coal. There must be a drastic revision of the attitude of the coal industry towards the supply of coal to the gas industry. The national need for conserving coking and gas coals must reinforce the need for manufacturing more combustible cokes by leading to the use of less mature coals for gas making.[7] Co-ordination may well involve setting up common standards of coke quality, including combustibility.

The sales methods of the coke ovens also leave much to be desired. The Coke Producers' Federation formed in Sheffield has shown so promising a beginning that it will evidently have to be extended after the war; there is, however, nothing like it in any other district. In the South of England, the London and Counties Coke Association has shown the way to

the rest of the country, and, in addition, coke sales staffs of southern gas companies have been enormously and successfully extended within recent years.

The gas and coke oven industries look forward to a considerable extension in the demand for gas and in collaboration they must pay attention to the sale of coke in the export market and at home, to balance production with demand. Selling schemes should certainly be co-ordinated and possibly merged into one combined organisation.

One form that co-ordination should take is that the coke oven owners should interest themselves in direct selling in the areas in which their coke is sold by becoming active members of the Coke Associations responsible. Unless the coke oven owner adopts this step he is at the mercy of circumstances, almost of chance, in retaining his markets. The two industries should therefore combine, and greatly extend, their coke sales organisations.

The supply of furnace coke is the business of the coke ovens and there must at all times be adequate capacity reserved for the iron and steel industry. This leads to the difficulty that coke is taken off or thrown on the general market according to the demands of the furnaces. Co-operation between the iron and steel industry and the colliery-owned coke ovens could overcome this difficulty by reserving adequate oven capacity for the steel works. This must be done primarily by agreement between those two industries. The gas industry can help, however, because production of coke for sale at gas works can be varied within quite considerable limits by the use of water gas. Production at the coke ovens can be varied by using producer gas for heating those batteries designed for the purpose. Thus, by co-ordination between the iron and steel industry, the coke oven industry, and the gas industry the essential outputs of coke for all purposes could be maintained at all times, and the markets for coke could be very greatly extended.

### Co-ordination of Tar Products

The co-ordination that is here suggested between the carbonising industries should be extended to tar products. There are associations covering certain of the primary tar products, but it is here suggested that these should be further co-ordinated into one body covering all primary tar products up to, but perhaps not including, intermediates. There are too many apparently unnecessary variations in price and there is to-day much waste of transport through moving tar products needlessly up and down the country. The association suggested would have a pool of common prices for purchasing tar and for selling all products. It would concentrate supplies where needed to avoid transport costs.

### Petrol Production

A probable post-war development will be the hydrogenation of tar at coke ovens and large gas works. The Fuel Research Board has devised a continuous tar hydrogenation plant. The necessary hydrogen can be produced from the residual gases in the last portion of the carbonising period by the aid of a double main. The author has also suggested[8] that since the gases from the hydrogenation plant leave the apparatus at a pressure of 150 atmospheres, when added to the remaining gas generated in the coke oven they would yield a mixture at a pressure of 180 lb. per sq. in. The carbonising plant could therefore convert the bulk of its tar into petrol, using low-cost hydrogen, and could obtain as a by-product the pressure necessary to distribute the gas over large areas, thus adding to the attractiveness of the gas grids.

The gas industry has recently organised the Gas Research Board, and after the war gas research is to be organised. The coke oven industry has no such body, and before one can be set up the coke oven owners must be convinced that research will be of value to their industry. When that has been done the work of the present Coke Research Committees can be extended to include all branches of the coke oven industry. Obviously the two sister industries should work in collaboration. A possible suggestion would be that the Gas Research Board should be divided into two parts. The director should be conversant with both industries; under him should be two deputy-directors each having his own staff, one for each industry. Thus complete collaboration could be attained without fear that either industry would be neglected.

### Future Developments

Scientific research is rapidly changing technical processes. The gases derived from petroleum cracking along with many of the constituents of natural gas, are becoming the raw materials for a huge organic chemical industry. Coal gas can be used similarly though in other directions. The research work of the Institution of Gas Engineers on total gasification may make the gas industry technically independent of coke. Unless these developments enable gas to be produced more cheaply in relation to the cost of living than to-day, however, it does not appear that the industry can afford to give up coke as a by-product. Even if the gas industry ultimately decides to leave coke production in the hands of the coke ovens there will be no less necessity for the co-ordination suggested in this paper. Active Government support for smoke abatement may be expected and in the present state of knowledge it is only by carbonisation that the necessary fuels can be produced. This gas industry research may enable liquid methane to be produced from coal; already investigators are studying the use of liquid methane as a fuel for transport engines. The provision of this fuel may alter the whole economics of gas manufacture within our life-time.

The future holds great possibilities, but these can only be fully grasped if the carbonising industries unite as a co-ordinated whole to produce and sell the manufactured fuels required by domestic consumers and industrial concerns.

[1] *J. Soc. Arts*, 1939, *86*, 530.
[2] P.E.P. Report on the Gas Industry, 1939, p. 49.
[3] *Cf.* Evans, E. V., *Trans. Inst. Gas Eng.*, 1937-38, *87*, 797–8.
[4] Bradley, G. W. J., and Foxwell, G. E., *J. Inst. Fuel*, 1938, *11*, 405.
[5] Lander, C. H., and Smith, E. W., *Proc. Brit. Assoc.*, Sect. G, 1934.
[6] *Cf.* Carr, W. M., *J. Soc. Arts*, 1939, *86*, 1020.
[7] *E.g.* Jamieson, J., and King, J. G., *Trans. Inst. Gas Eng.*, 1938-39, *88*, 387.
[8] Coke Oven Managers' Year Book, 1937, pp. 288–9; *Gas World*, 1936, *104*, *Coking Section*, 71.

## Waterproofing Paper

### Impregnation Process

PAPER, cardboard and similar materials, and textile fabrics can be rendered impermeable to water, alcohol, ether, petroleum, chloroform and other solvents, by impregnation by immersion or mechanically with a composition of gelatin and glycerin, as described in B.P. 533,539/1941 (S. Popovici); *see J. Text. Inst.*, 1941, *32*, 5, p. A210. To the composition is added, at a temperature which will ensure a suitable fluidity, a solution of salts of fatty acids, such as soap. Other chemicals, such as aluminium sulphate, may be added to increase the resistance of the final material to water and other solvents, and plasticisers, such as ethyl palmitate, may be added to give flexibility. After impregnation the material is passed through a solution of formaldehyde and water dried at atmospheric temperature.

During the process of impregnation or thereafter the material may be passed through rolls or a calender for the purpose of compacting the material or finishing the surface and, as an alternative to air-drying, the final material may be dried by passing through rolls heated to a suitable temperature. The proofed material is resistant to variations of temperature and can be used as a substitute for oiled silk, waxed paper, and gutta percha.

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The latest issue of "600," the magazine of GEORGE COHEN, SONS AND CO., LTD., and associated companies, although of war-time size is as entertaining as ever.

# Personal Notes

MR. H. E. G. WEST, general manager of the Chemical Works, of Newton Chambers & Co., Ltd., has been appointed managing director of the company, for the purpose of co-ordinating their extensive coal-mining, foundry, engineering, coal-distillation, and chemical operations. Mr. West joined

**Mr. H. E. G. West**

the company 22 years ago from the Contracts Department of the War Office, to which he was transferred after being seriously wounded in France in 1917. He has for many years been a prominent figure in the colliery and chemical industries and has served on many committees formed to promote research into coal chemistry and to develop the marketing of colliery products. The office of managing director of this old and famous firm has been in abeyance since the death in 1934 of Mr. W. Newton Drew, who combined it with that of Chairman of the Company. The present chairman is Sir Samuel Roberts, Bt.

MR. H. L. HOWARD has been elected president of the Birmingham Paint, Varnish and Lacquer Club, in succession to Dr. Learner. MR. A. BARNETT succeeds Mr. Howard as vice-president.

MR. ARTHUR DAWSON, district secretary of the National Union of Dyers, Bleachers, and Textile Workers, in S.E. Lancashire, was last week appointed to fill a vacancy on Bury Town Council.

MR. P. F. THOMPSON, of the metallurgy school, University of Melbourne, has been elected a Fellow of the Australian Chemical Institute. In addition to his university duties, Mr. Thompson has been deputising for Capt. E. H. Fraser, of the metallurgy department, Melbourne Technical College, who is absent on military service.

MR. G. R. BASHFORD, of Round Oak Steelworks, has for the third year been elected president of the Staffordshire Iron and Steel Institute. MR. H. J. MERCHANT, of Baldwin's, Stourport, it is announced, has been awarded the Institute's research medal and prize, for his paper on "Steel for Sheets."

MR. W. W. L. LISHMAN, of Todmordon, vice-president and hon. treasurer of the Textile Institute, is this year's recipient of the Institute Medal. The presentation will be made at Manchester on June 18, "in recognition of distinguished services to the textile industry, and particularly to the Institute" Mr. Lishman was largely instrumental in obtaining dyestuffs for the industry from Germany after the last war.

## OBITUARY

MR. W. G. CLARKE, research metallurgist at the Kalgoorlie School of Mines and one of the leading metallurgists in Australia, died at Kalgoorlie on March 9, aged 62.

MR. FREDERICK LEWIS JONES, whose death took place on June 7 at 28 Oak Drive, Denton, at the age of 57, was managing director of the Kilshaw Chemical Co., Ltd., Manchester.

MR. HERBERT T. FRADLEY, who died recently, was chief engineer to Messrs. W. and H. M. Golding, chemical manure manufacturers, Dublin, with whom he had served for 38 years.

## BIRTHDAY HONOURS

As befits the conditions of modern warfare, industrial science receives a generous share of the awards included in the civil list of birthday honours, published on June 12. PROFESSOR FREDERICK ALEXANDER LINDEMANN, Professor of Experimental Philosophy at Oxford, and Personal Assistant to the Prime Minister, has been created a baron; his position is best defined by the description of "scientific adviser to the Government." A baronetcy has been conferred on MR.

**Sir Francis D'Arcy Cooper, Bart.**

FRANCIS D'ARCY COOPER, chairman of Lever Bros. and Unilever, Ltd., and of the Executive Committee of the Export Council. MR. A. VYVYAN BOARD, lately Controller of Molasses and Industrial Alcohol, and of Plastics; MR. ARTHUR MATTHEWS, chairman of the Alloy and Special Steels Committee, Ministry of Aircraft Production; MR. HENRY GUY COOPER, general manager, Burmah-Shell Oil Storage and Distributing Co., India; MR. EDWARD BERNARD PRATT, managing director, I.C.I. (India), Ltd.; and MR. ARTHUR S. GAVE, U.K. Representative on the British Phosphate Commission, have been created knights bachelor.

The C.B.E. is conferred on MR. H. DAVIS, Director of Oils and Fats, Ministry of Food; ALDERMAN W. DEACON, President of the Pharmaceutical Society; MR. P. GOOD, Deputy Director, British Standards Institution; and MR. F. S. MITMAN, Controller, Sheet and Strip Light Alloy and Magnesium; and the O.B.E. is awarded to MR. J. B. NEVITT, general manager, ammunition dept., I.C.C. (Metals), Ltd. The M.B.E. goes to MR. P. E. KEAM, Council for Scientific and Industrial Research, Australia, and to MR. P. G. KNAPMAN, superintendent, Royal Gunpowder Factory, Waltham Abbey; and the following are awarded British Empire Medals: MR. J. GRACIE, charge hand, and MR. J. MONTGOMERY, foreman joiner, I.C.I. (Explosives), Ltd.; MR. J. JACK, foreman, and MISS C. E. PARRY, petrol gauger, I.C.I. (Metals), Ltd.; and MR. D. W. RUSHENT, storeman, Royal Gunpowder Factory.

# New Control Orders

## Export of Metal Drums and Asbestos

UNDER a Board of Trade Order which comes into force on June 10 licences will be required to export to all destinations metal barrels and drums and certain articles manufactured wholly or mainly from tin plate or terne plate. The Order (S.R. and O. 1941, No. 742) also extends the control in respect of asbestos (raw and fibre) to all destinations, and removes the necessity for export licences for salol and for amydricaine and its salts, except where licences are required for all goods.

# GOLD AND THE CHEMICAL ENGINEER

## Crushing, Agitating and Filtering Plant

by A. G. AREND and R. W. CORBETT

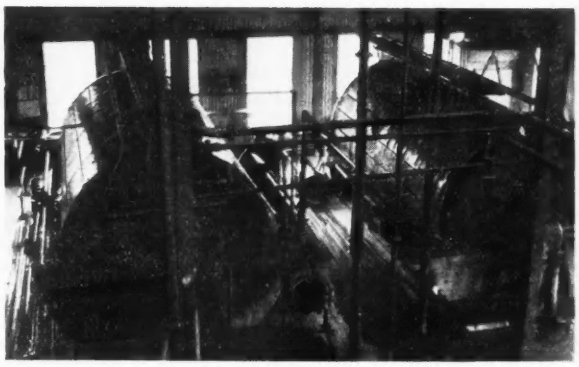
PLANT used in gold mining practice nowadays appears to be chiefly concerned with the most rapid possible extraction of the metal values, entailing the minimum of labour and the least attention to maintenance and repair work. These features are probably more significant in this industry than in any other pursuit, because of the possible loss of bank interest should the gold be inadvertently held up, and not despatched to the market with the least possible delay. The initial selection of plant is largely influenced by the type of mineral to be dealt with, and no hard and fast rules can be laid down to suit all raw materials. To start with, the selection of crushing devices is mostly confined to primary breakers and reduction crushers, of which the jaw crusher and gyratory crusher are still largely to the fore. Whereas a battery of such crushers was previously used in such a manner that additional units could be added as demand arose, the latest practice is to introduce exceptionally large jaw crushers, which operate on the same lines as the smaller types, but can handle boulders with the same ease. The largest Blake type jaw crusher can take boulders up to 8 ft. in diameter, while an improved design constructed on the same lines can reduce 10-ton boulders to pieces of about football size in little more than a minute. In operation this large crusher differs but slightly in general principles from those of smaller makes, with fly-wheels at the sides, swinging jaw, etc., but the height is some 17 feet, the total weight 240 tons, and the swinging jaw alone weighs some 40 tons. The tonnage crushed in this large-scale system depends, of course, on the hardness of the material, but has reached as much as 800 tons per hour, and even with harder ores amounts to 400 tons per hour. At some mines, three stages of the smaller jaw crushers are utilised to reduce the ultimate product to within ½ in. diameter. Where Dodge gyratory crushers are used, the material is reduced to from 10 to 12 mesh, but the modern tendency appears to favour ball-mills at this stage.

### Record Sheets for Crushers

At the gold mine, the capacity of these crushers is tabulated on record sheets. The figures include size of material received, jaw opening in inches, approximate capacity in tons when reducing to a fixed size in inches diameter, horse-power required, revolutions per minute, size of pulley, and total weight dealt with. With the gyratory crusher, tables are made out on similar lines, except that there is no jaw, and it requires less power than the other type, and details are tabulated of the fine setting and coarse setting to take a specific size of feed. At this stage about 10 lb. of lime per ton of ore are added, and the mass is charged into ball mills which operate at the rate of some 4 tons per hour, again depending on the size of the feed, but as a rule a battery of ball mills is preferred, of which the Edgar Allen type and Hardinge type are prominent. The mass then passes through tube-mills which have Dorr rake classifiers in closed circuit. Wet grinding is nowadays very largely, if not entirely, adopted for the cyanide process. Tube-mill data sheets are of a more elaborate nature, and include not only all details of the feed, capacity, size, and power supplied, but also all particulars of the grinding medium in a supplementary table. Where the ball mills deal with about 4 tons of ore per hour, the consumption of cyanide approximates to some 30 lb. daily, and thus relates more closely to smaller outfits.

The overflow from the classifier goes to a Dorr thickener, whilst the clear overflow from the latter is the pregnant solution, and passes to a Merrill Crowe precipitating plant. The thick underflow from the Dorr thickener passes through three Dorr agitators, whence the pulp is passed through a further thickener, and the underflow then feeds two or more Paxman filters. As a rule two of these filters suffice, the second one taking the repulped cake from the first, thus ensuring appreciable efficiency. Clay and soil material from the horizontal entrance tend to hinder each of the operations of settling, thickening, and filtering. Between the tube-mill discharge and the Dorr classifier the pulp is diluted, and passes over five corduroy blanket strakes, which have to be continually changed and washed, and catch some 40 per cent. of the total values.

Particulars of the cyanide treatment have previously been published, and need not be repeated here in detail. With smaller gold-mining enterprises, the concentrates are treated



**Two Paxman filters in operation**

twice daily in amalgam barrels on the familiar copper plate, after which this amalgam is collected for future retorting, together with all zinc slimes. One result of the high price of gold is that numerous disused mines have been reopened, and in view of the poorer output of gold, the amalgamation process is applied on a more limited scale, and instead of the retorting process being conducted daily as it is at richer mines, a predetermined amount of gold is allowed to accumulate in the amalgam which is then transferred to the retorts. Coke-fired tilting furnaces of the Morgan or similar type are then used to melt the gold, and run it into bars, and this section of the work is usually carried out in the laboratory, while all old plumbago pots are collected so that the linings containing particles of gold may be returned to earlier parts of the process. The use of iron moulds for the making of ingots or bars has been criticised, although the practice is still persevered with, but the faces of the gold are given a short immersion in dilute aqua regia so as to remove the outer skin.

Although the product so obtained is to all intents and purposes pure gold, a certain small percentage of the other precious metals (platinum, rhodium, and associated metals) is also not infrequently present, and necessitates the subjection of the metal to a further refining process. In certain districts it would appear that rhodium has almost disappeared, whilst in its place iridium and other members of the rare group present themselves. All these metals, however, can be conveniently separated by the electrolytic refining system which provides pure gold at the cathode, and an anode sludge containing the rare impurities. The molten gold from the tilting furnaces is run into anode moulds, which are purposely made to give an anode of only a few millimetres in thickness, whilst the cathodes are cut from thin sheets of rolled gold. By working thus the anodes are eaten away within 24 hours, with the distance between electrodes approximately ¾ in., while by an improved method of applying the current the time occupied can be considerably reduced. Earthenware

vessels are used for the electrolysis baths, and current density is applied at 50 amps. per sq. ft., being varied according to the purity of the gold. The temperature is maintained at from 60° to 70° C., and the electrolyte is best served when it contains from 25 to 30 gm. gold per litre, and hydrochloric acid of 1.19 sp. gr. The concentration of this acid has to be varied within somewhat wide limits, but is generally between 20 and 50 c.c. per litre. What small percentage of platinum is present remains in solution until it reaches twice the amount of gold present, but salts are necessary in the solution to insure a coherent deposit of gold. Under these conditions, the metal deposited on the cathode is only pure gold, and an immediate recovery can be made of all rare by-products left in the electrolyte and the anode mud.

While the crushing plant, agitators, thickeners, and filterers, etc., can be purchased from established makers, the electrolytic refining equipment has to be constructed by the refiners themselves, or by mining engineers acquainted with this work, as the demand is limited. The final refining of gold in this manner, besides giving an absolutely pure metal, provides a source of income from the rarer metals recovered, since being free from association with base metals their separation is simplified. In reviewing plant used in modern gold mining enterprises, a combination of engineering and chemistry is necessary to cope with the various problems which arise, and there is little doubt that, given good selection, all gold-bearing materials can nowadays be handled with the utmost efficiency.

# Monazite Sands

## A Method for their Evaluation

MONAZITE (phosphate of cerium and related metals) is found in heavy sands resulting from the disintegration of acidic igneous rocks. The examination of these sands for commercial valuation is a problem that may occasionally have to be faced. The following method used by Mr. Albert E. Williams, formerly Commonwealth Assayer at Darwin, N. Australia, and reported in the *Chemical Engineering and Mining Review*, will be found satisfactory.

When necessary, the sample is concentrated by panning, and the product obtained warmed with concentrated $H_2SO_4$. A few drops of the liquid are decanted and evaporated to a small volume. One drop is transferred to a glass slide and placed under the microscope. One drop of a concentrated solution of sodium acetate is now added and if monazite is present, minute oval crystals of sodium cerium sulphate separate out.

As it is to the thoria content—usually from 5 to 7 per cent.—that the mineral owes its commercial value, the determination of the thorium oxide percentage is the only estimation to be undertaken. For sands and eluvial concentrate occurring in the Northern Territory, invariably low in thoria content (1 to 1.5 per cent.), the following method was adopted. The method depends on (a) the separation of thorium and other rare earths by precipitation as oxalates in neutral solution; and (b) precipitation of thorium as peroxynitrate from a neutral solution of ammonium nitrate by the addition of hydrogen peroxide.

The finely divided sample of 0.5 gm. is intimately mixed and fused with 0.5 gm. sodium fluoride and 10 gm. $NaHSO_4$ in a platinum crucible. After cooling, the melt is extracted with water and a few c.c. HCl, and the liquid heated to boiling. The residue (largely silica and tantalic and niobic acids) is allowed to settle, filtered, and washed twice with hot water. The residue on the filter is washed back into the beaker and digested with concentrated HCl, diluted, refiltered, and washed. The combined filtrate containing all the thorium is nearly neutralised with ammonia, heated to boiling, and 3-4 gm. solid ammonium oxalate are added with stirring, when oxalates of the rare earths will be precipitated.

Allow to stand overnight, filter, wash with hot water and transfer to a porcelain basin. Wash the filter with hot concentrated $HNO_3$ and add to original filtrate. Evaporate to dryness, digest with 10 c.c. $HNO_3$ (sp. gr. 1.4) and 20 c.c. fuming $HNO_3$, and digest under a cover until all action has ceased. Wash the cover, evaporate solution to dryness, moisten with water, and cautiously dry on water bath. Take up with water and dilute to 100 c.c., add 10 gm. ammonium nitrate, heat to 70° C. and precipitate thorium as thorium peroxynitrate by the addition of 20 c.c. 3 per cent. hydrogen peroxide, filter-wash with 2 per cent. ammonium nitrate solution. Redissolve in dilute $HNO_3$, evaporate to dryness, moisten with water, and after redrying redissolve in 100 c.c. 10 per cent. ammonium nitrate, and reprecipitate from neutral solution as thorium peroxynitrate. Filter, wash with 2 per cent. ammonium nitrate, dry, ignite, and weigh as thorium oxide.

# New Fluorescent Lamp

## Lighting for Critical Chemical Operations

IT is claimed for the new 80-watt fluorescent tubular lamp that for all practical purposes its light output is equivalent in quality to daylight. In certain circumstances it may even be superior to natural light.

A vital chemical process in a Government factory involves the addition of acids to a liquid solution by carefully controlled stages, as a result of which the liquid changes in colour. These changes determine the point at which further acid is added. The operation is so critical that it could normally be carried out only under the most favourable daylight conditions. The introduction of the fluorescent tubular lamp promised an opportunity of providing controlled light closely resembling daylight, but more constant in character. Investigation showed that an illumination of 120/150 foot-candles over a working area of 6 ft. by 4½ ft. would be necessary to provide sufficient illumination to enable the delicate changes in hue to be easily discerned. A special fitting was therefore designed by Crompton Parkinson, Ltd., to accommodate four 80-watt Crompta tubes and was mounted at a height which ensured that the light source was not in the line of vision. As aluminium was not obtainable, the reflector was constructed of sheet brass with a chromium-plated reflecting surface, the exterior being painted with acid-resistant material. This important process may now be continued day and night without interruption and with great efficiency.

## A CHEMIST'S BOOKSHELF

THE IDENTIFICATION OF MOLECULAR SPECTRA. By R. W. B. Pearse and A. G. Gaydon. London: Chapman and Hall. Pp. 221, plate VIII. 42s.

The present volume is the ideal companion to the recently published M. I. T. Wavelength Tables. As the foreword points out, the identification of molecular spectra has generally, till now, been a difficult and tedious process. Here we are given first a table of more persistent bands of the molecules, arranged in order of wavelength. This is followed by fuller tables of the spectra, absorption and emission, shown by each molecule. The system is admirable, giving full and rapid information. The practice of noting original papers containing useful photographs is noteworthy. The section devoted to practical hints is concise, and valuable for those who are less versed in the field of molecular spectra.

That there should be omissions in so ambitious a project is inevitable. With an eye to future editions, two of these are mentioned. The most obvious is that of organic absorption spectra, which the authors admit they have scarcely touched. The field is very extensive, but the need for collected data is fully as great as that met by this work as it stands. It would be a great aid to easy reference if the list of sensitive lines were given in order of wavelength as well as being tabulated under the elements as at present.

The reviewer hastens to stress that he has a profound admiration for the book as it stands. Authors and publishers are equally to be congratulated for their part in the production of an extremely important and finely accomplished reference work.

# General News

THE NEW ADDRESS of C. Tennant, Sons and Co., Ltd., is 15 America Square, Minories, London, E.C.3.

UNITED KINGDOM CADMIUM PRICES have been raised to 5s. 4d.-5s. 5d. per pound, delivered consumers' premises, compared with 5s.-5s. 1d. per pound.

A NEW BOARD OF TRADE ORDER, which came into force on June 7, contains 190 additions to the "black list" of traders in neutral countries with whom it is unlawful to have dealings of any kind.

AMONG RECENT GIFTS IN KIND contributed for Red Cross use by employers who are backing up the efforts of their employees in the Red Cross Penny-a-Week Fund, is included a donation of a million aspirin tablets offered by a London firm of manufacturing chemists.

DURING A CASE AT Tower Bridge (London), on June 5, it was stated that the Ministry of Food lost control of 12,000 tons of farina (a starch product essential to some war industries) because some firms had used it without permission. Summonses were pending against the firms.

THE THARSIS COPPER AND SULPHUR WORKS, Hebburn-on-Tyne, which have lain idle for five years, have been disposed of. The plant, machinery and buildings have been sold under authority granted by the Ministry of Supply. The works were established 70 years ago.

LORD TRENT, HEAD OF Boots, Ltd., and owner of the 50,000 acre estate of Arduamurchan, Argyll, has devised a scheme for utilising his Scottish residence, Glenborrodale Castle, as a holiday rest home for employees of the firm, especially those who have remained at their posts in centres subjected to indiscriminate bombing.

THE FOLLOWING HAVE BEEN elected Fellows by the Board of the Institute of Physics: J. Bor, B.Sc., M.Sc. (Tech.); C. G. Garton; S. Jnanananda, D.Sc.; A. F. B. Nickson, M.Sc.; P. A. Sheppard, B.Sc.; A. Simons, M.Sc.; and F. A. Vick, M.Sc., Ph.D. Ten Associates were likewise elected, and one subscriber and eleven students admitted.

AT THE ANNUAL GENERAL MEETING of the Institute of Physics, held on June 4, the following were elected to take office on October 1, 1941: President, Professor Sir Lawrence Bragg; Vice-President, Professor W. Makower; Hon. Treasurer, Major C. E. S. Phillips; Hon. Secretary, Professor J. A. Crowther; Ordinary Members of the Board, Professor J. Chadwick and Mr. D. C. Gall.

A REVISION OF THE BRITISH STANDARD for aluminium alloy tubes (duralumin) has recently been published (price 1s.). The essential feature of the revision is the amplification of the clauses on mechanical testing and of the table of tube sizes to include details of the physical properties. The proof bending test is specified for circular tubes over ½ in. diameter. Notes have been included indicating the basis for calculating the tolerances and other dimensions.

OWING TO THE SUDDENNESS of the announcement regarding the rationing of clothes, the British Colour Council have decided to release information regarding colours at a slightly earlier date than usual, and a résumé of the colours appearing on the Council's cards for Autumn, 1941, is now available. It is noted that in the long run the rationing of women's clothes may prove beneficial, as a surfeit of riches rarely results in good taste, while careful selection should sharpen an already keen sense of colour.

ONE OF THE UNANIMOUS CONCLUSIONS reached by the Committee on Cement Production, whose report is published as a White Paper, is that existing works are capable of producing all the cement likely to be needed in war-time. They consider that the consumption is unlikely to exceed 6,000,000 tons, and that there is sufficient labour at present to produce 7,500,000 tons. Moreover existing works together with projected extensions are considered to be in a position to meet the greatest demand which may arise during the first two years after the war.

## Foreign News

THE NEWLY-ERECTED chlorates plant of the Chipman Chemical Co., at Portland, Oregon, was destroyed by an explosion on March 25. One man was killed and over a dozen injured. The damage is estimated at $50,000.

# From Week to Week

TO MEET THE DEMAND FOR aviation lubricants, a special campaign is being conducted in Italy to encourage the cultivation of the castor plant; growers are being offered attractive prices.

SHOES MADE ENTIRELY OF STRAW are the latest result of the leather shortage in Germany. In Hungary aluminium is being used for soles. A metal frame gives the necessary support for the foot, and the customer can have low heels of straw or higher heels of wood.

DEVELOPMENT OF THE MERCURY DEPOSITS at Kilkivan, Queensland, continues. Queensland Quicksilver, Ltd., have constructed four more retorts for distillation, and Q.S. Mines are reported to be installing two new retorts. Exploitation of adjoining properties is likewise proceeding.

THE IMPORTS OF both shellac and mica into Japan are not shown separately in the trade accounts of that country, but according to the Indian Trade accounts the decline in purchases of shellac from India during the last two years continued throughout 1939-40. Mica, on the other hand, remained at the high level of the preceding year. It is mainly used for military purposes and comes principally from India.

ACCORDING TO AN ORDER issued jointly by the Board of Trade and the Ministry of Economic Warfare, Syria and the Lebanon are regarded, from May 27, as enemy-occupied territory for the purpose of the Trading with the Enemy Act, and economic warfare. Events since the publication of the Order make it appear that before long it may become possible to rescind the Order, and incorporate Syria within the sterling bloc.

THE PERUVIAN GOVERNMENT has issued a resolution, dated May 8, prohibiting the export from Peru, without Government permission, of the following goods (among others): antimony, arsenic, chrome, cobalt, copper, copra, lead, manganese, mercury, mica, molybdenum, nickel, quinine, rubber, sulphuric acid, tanning materials, tin, titanium, tungsten, wolfram, uranium, vanadium, and zinc.

IN 1940 THE VALUE OF Canadian chemical exports to Latin America amounted to $1,611,000, including sodium compounds at $1,063,000 and calcium carbide at $548,000. Shipments of sodium compounds last year were made chiefly to Mexico, whose share was approximately 90 per cent. of the total value, the balance going to Honduras, Peru, Nicaragua, and Ecuador. Calcium carbide exports, formerly limited to three of the Latin American countries, were distributed among 16 of the 21 countries in 1940, the chief destinations being Chile, Argentina, Venezuela and Cuba.

# Forthcoming Events

THE LONDON AND SOUTH EASTERN COUNTIES SECTION of the Institute of Chemistry will meet conjointly with the London and Home Counties branch of the Institute of Physics at 6 p.m., on June 17, in the Lecture Hall, Social Centre of Messrs. Kodak, Ltd., Wealdstone, Harrow, when Dr. D. A. Spencer, F.I.C., Hon. F.R.P.S., will lecture upon "Photography in Industry."

THE MATHER LECTURE of the Textile Institute will be delivered at 2.45 p.m. (following the Institute's luncheon) on June 18, at the Midland Hotel, Manchester, by Dr. J. B. Speakman, Professor of Textile Industries at Leeds University. His subject is "The Chemistry of Wool and Related Fibres."

A LECTURE before the Chemical Society on "Vitamins of the B Group" will be delivered by Professor A. R. Todd, D.Sc., Ph.D., in the Society's rooms, Burlington House, London, W.1, on June 19, at 4.15 p.m.

AN INFORMAL DINNER of the Institution of Factory Managers will be held at the Hotel Russell, Russell Square, London, W.C.1, at 6.30 p.m., on June 21. The cost will be 11s. 6d., exclusive of wines. At the dinner a presentation will be made to Mr. J. Gordon Miller, B.Sc., A.M.Inst.C.E., in recognition of his valuable services to the Institution as first Chairman of the Council, from 1938 to 1941. Mr. Gordon Miller has stipulated that the bulk of the amount collected shall be spent on a rifle, to enable members of his Home Guard unit to obtain shooting practice.

# Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

## Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary. but such total may have been reduced.)

JAMES JENNINGS & CO., LTD., Darlington, soap manufacturers. (M., 14/6/41.) May 2, mortgage and charge, to Midland Bank, Ltd., securing all moneys due, and to become due, to the bank; charged on land and soap manufactory and other buildings at Drinkfield, Darlington, also general charge. *Nil. February 23, 1940.

LA BARRE, LTD., Wolverhampton, enamel manufacturers. (M., 14/6/41.) April 29, £700 (not ex.) mortgage, to Lloyds Bank, Ltd.; charged on land and premises at Bond Street, Heath Town, Wolverhampton. *—. September 13, 1940.

BARNET INSTRUMENTS, LTD. (M., 14/6/41.) May 8, mortgage to Midland Bank, Ltd., securing all moneys due, or to become due, to the Bank; charged on contract moneys. *Nil. June 26, 1940.

SOFNOL, LTD., London, S.E., water softening materials. (M., 14/6/41.) April 30, mortgage to Credit for Industry, Ltd., securing £7000 together with any arrears of interest which may be capitalised; charged on land and buildings. Anchor & Hope Lane, Charlton & Kidbrooke, S.E. *Nil. July 4, 1940.

RAINES & PORTER, LTD., Hull, paints lubricants, etc. (M., 14/6/41.) May 8, £10,000 debenture to Branch Nominees, Ltd.; general charge (subject to, etc.). April 14, 1940.

## Company Winding-Up Voluntarily

BRITISH CARBONIC CO., LTD. (C.W.U.V., 14/6/41.) By special resolution, May 29. Reginald Langford Latimer, 4n, Frederick's Place, Old Jewry, London, E.C.2, appointed liquidator.

## Receivers Ceasing to Act

CELLULOSE COMPOSITIONS CO., LTD., Trumpington (R.C.A., 14/6/41.) W. L. Dominy, April 18.

## Receivership

R. WOOD & CO., LTD., Cement Manufacturers, London, (R., 14/6/41.) L. G. Baker, 7 Warwick Court, Grays Inn, W.C.2, appointed receiver on May 6.

## County Court Judgments

BEAUCHAMP, HERBERT REGINALD, Droskyn, 5 Parkside, Mill Hill, Imperial Chemicals official (C.C.J., 14/6/41). £25 19s. 4d., March 26.

WILLIAMS, JACK, 33 Everton Road, Manchester. (C.C.J., 14/6/41.) Manufacturing chemist, £65 19s. 2d., February 2, 1926.

## Declarations of Solvency

CELCOMENT, LTD. (D.S.F., 14/6/41.) Declaration of solvency filed April 29.

DOX, LTD. (D.S.F., 14/6/41.) Declaration of solvency filed May 1.

## Satisfactions

H. & S. PRODUCTS, LTD., Todmorden, soap manufacturers, (M.S., 14/6/41.) Satisfaction, April 28, of mortgage, registered January 6, 1937.

PILKINGTON BROTHERS, LTD., Liverpool, glass manufacturers. (M.S., 14/6/41.) Satisfaction, May 3, of debenture stock, registered May 4, 1925, to the extent of £45,000.

NATIONAL FEDERATION OF ASSOCIATED PAINT COLOUR & VARNISH MANUFACTURERS OF THE UNITED KINGDOM, London, W.C. (M.S., 14/6/41.) Satisfaction, May 12. £600, registered December 10, 1940.

BRITISH BURMAH PETROLEUM CO., LTD., Taunton. (M.S., 14/6/41.) Satisfaction, May 5, of debenture stock, registered February 25, 1936, to the extent of £20,000.

BRITISH CELANESE, LTD. (S., 14/6/41.) Satisfaction, May 29, of debenture stock registered June 21, 1934, to the extent of £4500.

# Company News

**Metal Industries, Ltd.**, have declared a final dividend of 2½ per cent., making 5 per cent. for the current year.

**Fison Packard and Prentice, Ltd.**, have declared an interim dividend of 2½ per cent. (same).

**Stream-Line Filters, Ltd.**, made a net profit for 1940 of £23,127, The ordinary dividend is 7 per cent. (same).

**British Enka, Ltd.**, record a profit in 1940 of £20,505, after allowance for taxes (last year, £97,172). Debit balance carried forward is reduced to £566,860.

**The Amalgamated Metal Corporation, Ltd.**, have declared a dividend on the ordinary shares of 6 per cent., less tax, for the year ended March 31. Net profit for the year was £326,834 (£365,393).

The business of **John Glen**, of which Mrs. Jeanie Glen was the sole partner, has been acquired by the **Atlas Crucible Co., Ltd.**, who will continue the business under the firm name of John Glen, Kilkerran Chemical Works.

**British Luminous Industries, Ltd.**, have increased their nominal capital beyond the registered capital of £100 by the addition of £4900. The additional capital is divided into 2000 preference shares of £1 and 58,000 ordinary shares of 1s. each.

**Explosives and Chemical Products, Ltd.**, are to hold an extraordinary meeting, on June 30, to consider the removal of five members of the board in acordance with the provisions of article 78 of the company's articles of association. Shareholders will be asked to approve the appointment of four new directors.

**The Electrolytic Zinc Company of Australasia,** in order to provide finance for plant extension, has decided to issue 400,000 ordinary shares of £1 each. These shares will be offered at par to shareholders in the proportion of 16 new shares for every 104 shares, preference or ordinary, now held. The new shares will be offered to shareholders registered on June 20.

# New Companies Registered

**Panta Manufacturing Company, Ltd.** (367,467).—Private company. Capital: £100 in 100 shares of £1 each. Manufacturers of all kinds of goods, particularly those in which industrial waste is used, etc. Directors, Max Sigall; Susanne Stein; Arthur Frapwell. Solicitors: Theodore Elman and Co., 20 Bedford Square, W.C.1. Registered office, 88 Golden Lane, E.C.

# British Chemical Prices

## Market Reports

THE general chemical markets continue to follow a very even trend, and the movement in the aggregate to the consuming industries has been quite good. There has been a steady call for most of the soda compounds, and in the potash section offers of nearly all products have been insufficient to meet the demand. There is a good enquiry for borax and boric acid, supplies of both items being carefully allocated. In the acid section tartaric and citric are firm, whilst supplies of oxalic acid continue scarce. In regard to the coal tar products, strong price conditions are again reported for most items. A steady buying interest is reported for both the crude and crystal carbolic acid, and there is an active inquiry for solvent naphtha. Cresylic acid is an active market, with spot supplies difficult to negotiate.

MANCHESTER.—Trading conditions on the Manchester chemical market during the past week have been somewhat livelier after the Whitsun holiday interruptions. Consumption in one or two directions is appreciably below normal as a result of the war, and is likely to remain so, but there is a fair demand for a wide range of textile chemicals and a steady trade in the leading heavy products in other directions has been reported this week. Values generally are well maintained and strong in tendency. Tar products are very active for the most part, and the recent advances in cresylic acid and one or two other materials are fully held.

GLASGOW. There has been considerable and steady buying during the past week in the Scottish heavy chemical market as there is a tendency for prices to go to a higher level.

## Price Changes

**Arsenic.**—£35 per ton, ex store.

**Carbolic Acid.**—Crystals, 10d. to 10¾d. per lb.; crude, 60's, 3s. 6d. to 4s., according to specification. MANCHESTER: Crystals, 10¼d. per lb., d/d; crude, 3s. 8d. to 3s. 11d., naked at works.

**Cresylic Acid.**—Pale, 99/100%, 2s. 9d. to 3s. 3d. per gal. MANCHESTER: Pale, 99/100%, 3s 2d. per gal.

**Potassium Chlorate.**—Imported powder and crystals, ex store London, 2s. per lb. nominal.

**Pyridine.**—90/140°, 7s. 6d. per gal.; 90/160°, 13s. 6d.

FIVE GERMAN MERCHANTMEN, according to a Press Association's message, are attempting to run the Atlantic blockade laden with "Chilean coal," having left a port in Chile on May 17. As a correspondent to the *Manchester Guardian* points out, however, such little coal as there is in Chile is of very low grade, and the cargoes are much more likely to be copper or nitrate of soda. The writer adds, pertinently, that our naval authorities will soon have an opportunity of investigating the nature of these "coal" exports.

# Chemical and Allied Stocks and Shares

ALTHOUGH the volume of business in the stock and share markets showed little, if any, improvement, firm market conditions have been maintained, sentiment having been assisted by the latest war news. The prevailing belief in the City is that rationing of clothes and other developments will tend to increase the weight of money available for investment in British Funds, and that consequently, the trend in the latter will be to higher prices. Moreover, the tendency in gilt-edged stocks will no doubt continue to be an important factor governing the general undertone of the Stock Exchange. Industrial securities have been steady, and on balance the majority of movements did not exceed a few pence. It is realised that higher taxation and other factors must make for lower dividend payments, but the assumption is that this is probably already discounted in share prices.

Shares of companies in the chemical and allied trades reflected the surrounding steadiness of the stock and share markets. Imperial Chemical at 30s. 10½d. were again virtually unchanged on balance, but the 7 per cent. preference were slightly easier at 33s. 6d., although later they recovered to 34s. Fison Packard and B. Laporte were inactive, but have remained around 32s. and 60s. respectively. British Oxygen were unchanged at the lower price of 65s. 7½d. made a week ago; the yield on the basis of last year's 15 per cent. dividend is small, but this reflects the belief that the company is likely to remain actively employed during the period of the war, and that the dividend rate may be maintained. Similar remarks explain the modest yields shown by Turner & Newall at 68s. 3d. (last year's dividend was 15 per cent.), and also by Murex, whose dividend last year was 20 per cent., and who are now quoted at 82s. 6d. Hopeful market views in regard to the forthcoming results have maintained firmness in the ordinary units of the Distillers Co., which at 64s. 6d. were virtually unchanged. British Aluminium were slightly better at 40s. 9d., and Borax Consolidated have been steady at 28s. 6d. There was again a fair amount of activity in British Plaster Board 5s. shares, which changed hands around 15s., awaiting declaration of the final dividend. No movements of importance were shown among Associated Cement and other shares of cement manufacturers. Among textile securities, some attention was given to various of the depressed preference shares carrying large arrears of dividend, including those of Bradford Dyers and Calico Printers. Elsewhere, Courtaulds had an easier appearance at 29s. 9d.

In the iron and steel section movements were mostly in favour of holders: Babcock & Wilcox were 40s. 9d., Stewarts & Lloyds 42s. 6d., and Tube Investments 90s. 6d. Ruston & Hornsby were better at 28s. 3d. on the dividend, while Guest Keen were 23s. 4½d. The preliminary statement of the last-named company is not expected on this ocasion until the end of this month or the early part of July. In other directions, Pinchin Johnson were 6d. better at 19s. 6d., and International Paint held their recent improvement to 83s. 6d., while Wall Paper Manufacturers deferred units remained at 22s. Goodlass Wall & Lead Industries 10s. ordinary shares were again around par. Among smaller-priced shares, British Tar Products 5s. ordinary have changed hands at 6s., and business in Erinoid 5s. shares took place at 3s. 6d., while Low Temperature Carbonisation 2s. ordinary changed hands around 1s. 1½d. Greeff-Chemicals 5s. ordinary were again quoted at par.

Awaiting declaration of the final payment for the financial year, Boots Drug 5s. ordinary shares were slightly lower at 35s. 7½d. Timothy Whites 5s. shares were quoted at 19s. 6d., and Sangers at 15s. 1½d. Although "ex" the dividend, "Shell" were again around 40s.; there was a somewhat better tendency in Burmah Oil and various other oil shares.

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The information bulletin for May published by Messrs. GEORGE KENT, LTD., Luton, is mainly taken up by an article which appears under the laconic title of "Blast." It is made up from notes on high explosives compiled by Capt. C. W. Glover, M.Inst.C.E. There are also pictures of clear view screens fitted to a Polish destroyer and a Vosper-built motor torpedo boat.

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Feeding the nation embraces the biggest problem of the war, ranging as it does from the Battle of the Atlantic to the cooking of meals for homeless people. THE BRITISH COMMERCIAL GAS ASSOCIATION, 1 Grosvenor Place, London, S.W.1, in their illustrated booklet entitled "Feeding the Nation" have accordingly limited themselves to the solving of difficulties encountered when organising British restaurants and emergency feeding centres. The booklet describes the vital rôle gas cooking apparatus is playing in all such kitchens.


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